Advanced Telescope and Observatories Capability Roadmap Overview

Lee Feinberg, NASA GSFC, NASA Chair
Howard MacEwen, SRS/NRO, Co-Chair

December 1st, 2004

Charter/Definition Statement

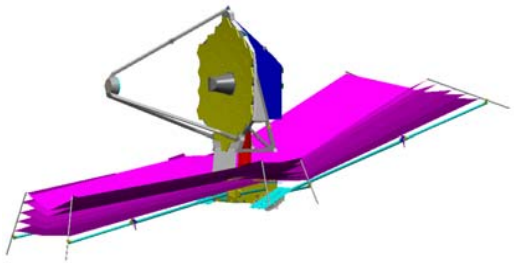
- Assess the technical readiness of the nation in the area of Advanced Telescopes and Observatories to achieve NASA's priority long-range goals (over the period 2005 – 2035) and assist in developing a technology strategy to meet these goals.
- Consider technologies necessary to enable future telescopes and observatories collecting all electromagnetic bands, ranging from x-rays to millimeter waves, and including gravity-waves.
- Prioritize activities to be consistent with the current and developing Space Missions Directorate (SMD) science roadmaps. The Committee will consider all technologies associated with the collection and combination of observable signals.
- The Committee will not consider technologies associated with the detection, conversion, or processing of observed signals into data. These technologies are the responsibility of the Scientific Instruments and Sensors Roadmap Committee take priority.

Strategic Dependencies

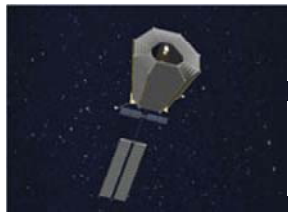
- The ATO committee will coordinate its activities with four primary APIO Strategic Committees:
  - #4 Advanced telescope searches for Earth-like planets and habitable environments (Search for Origins)
  - #8 Explore the origin, evolution, structure and destiny of the Universe (SEU)
  - #9 Determine how living Earth system is affected by internal dynamics, and understand implications for life (Earth Science)
  - #10 Explore Sun-Earth system to understand effects on Earth and implication for human exploration (SEC)

ATO Technology Applications

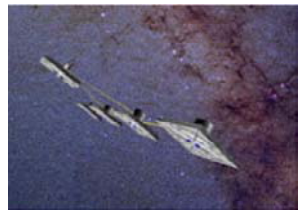
Advanced Telescope and Observatory Technology covered by this area are key to enabling and enhancing several near and far term missions. A few examples:



James Webb Space Telescope:
NIR Probe of early Universe



TPF-C



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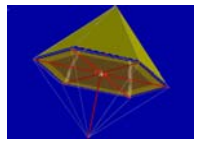
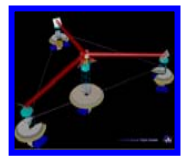


30-m Geo SAR for earthquake detection

Terrestrial Planet Imager:
First images of planets

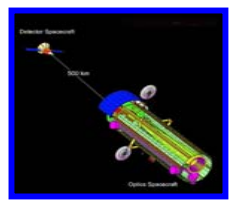
SAFIR: FIR



SPECS: FIR Interferometer

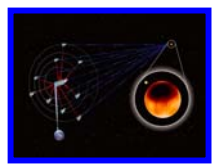
Constellation X:
X-ray Spectroscopy

SIM: Astrometry



MAXIM:
Black Hole Probe

Stellar Imager
Interferometer



Current Technology (0-5 Years):
Deployed Lighweight Optics
Wavefront Sensing and Control
Precision Metrology/Interferometry

5-15 Years:
Deformable Mirrors
Precision Optics
Coolers
Initial formation flying

30 Years:
Imaging Interferometry
Formation Flying
Space Assembly
Large Structures

Advanced Telescope and Observatory Capability Roadmap Panel

• Chair	Dr. Lee Feinberg	NASA GSFC
• Co-Chair	Dr. Howard MacEwen	SRS/NRO
• APIO Coordinator	Dr. Dan Coulter	JPL
• Integration Coord	Dr. H. Philip Stahl	NASA MSFC
• Space Sciences	Dr. James Breckinridge	JPL/HQ
• Earth Sciences	Dr. David Tratt	GSFC/ESTO/HQ
• Other Govt.	Dr. Peter Jones	AFRL

Academic:

• Dr. David Miller	MIT
• Dr. James Fienup	Univ of Rochester
• Dr. Dan Inman	Va Tech
• Dr. James Burge	Univ of Arizona

Industry:

• Dr. James Crocker	LMCO
• Dr. Ronald Polidan	NGST
• Dr. Mark Stier	Goodrich
• Dr. Doug Neam	Ball Aerospace
• Dr. Gary Matthews	ITT (formerly Kodak)

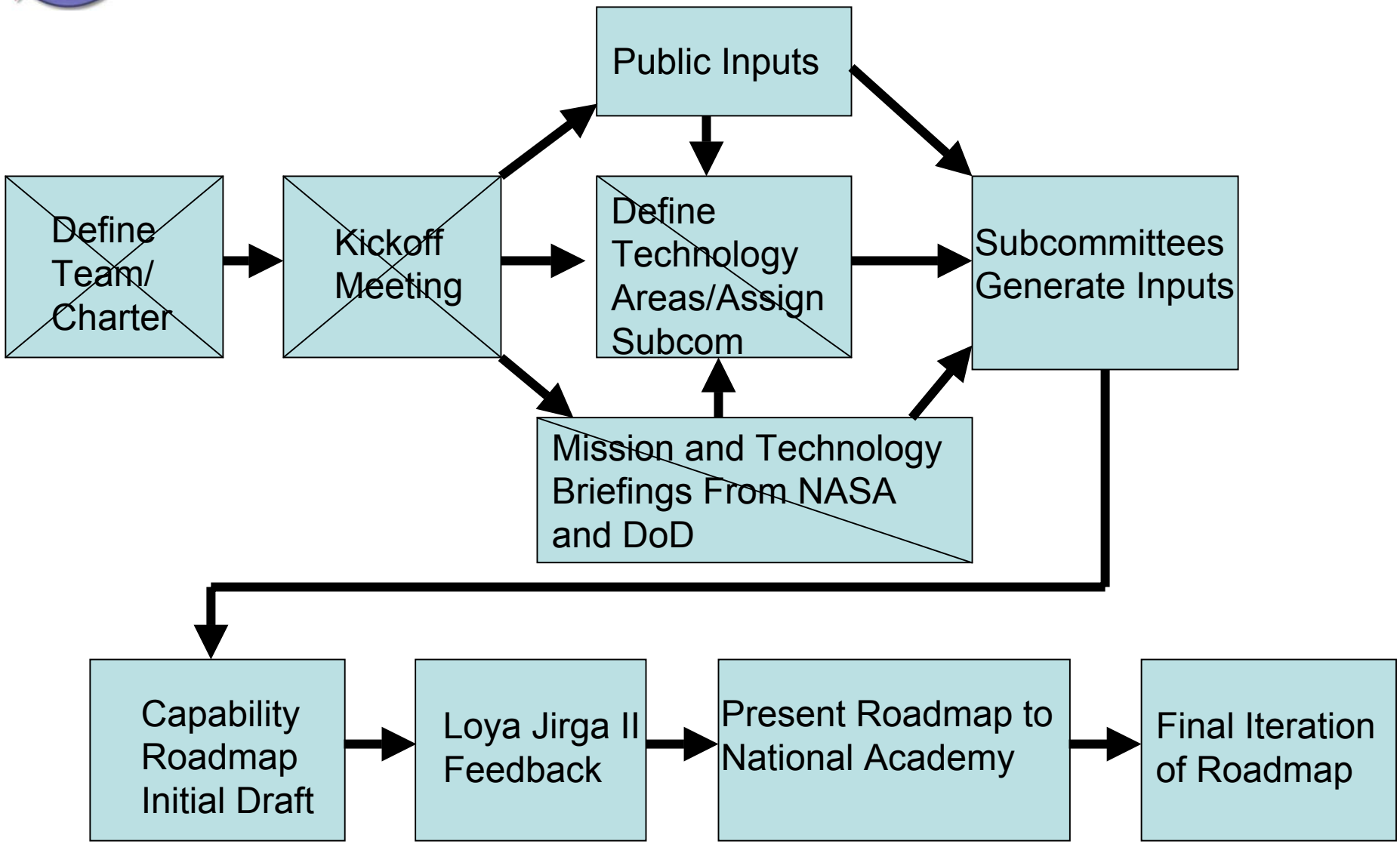
ATO Technology Areas

- Optics
- Wavefront Sensing and Control/Interferometry
- Thermal and Cryogenic Management
- Formation Flying/Platforms
- Large Structures/Deployables
- Infrastructure

Example of Further Breakdown

- Infrastructure
  - Test Facilities
    - Hardware and facilities for integration and test on the ground
    - Capabilities for reliable system integration and test in space (overlaps with system modeling.)
  - Work force
  - System modeling tools
  - On-orbit observatory support

Committee Process



Status

- Team had kickoff meeting at JPL in November
- Meeting Planned at GSFC Dec 1+2
- Future meeting planned at Albuquerque (in January)
- Final Draft Roadmap Meeting Planned in Boulder (before Loya Jirga II)
- Team has broken into subcommittees for each technology area
  - Subcommittees have begun telecons and meetings
  - Public white-papers have been forwarded to the subcommittees
- Team has reviewed previous NASA roadmapping activities (CRAI, Code S, etc.)

White Papers Submitted to ATO

- Received 22 Advanced Telescope Whitepapers
  - 16 from industry and academia, 6 from NASA
- Invited 10 talks (based on who was attending)

Agenda

- 9:30-10 Current Status of Roadmap and Related Information, Lee Feinberg, NASA Co-Chair for Advanced Telescopes and Observatories

  10-10:15 Process for Public Input Explained, Dan Coulter, APIO Coordinator
  10:15-11:45 Non-government presentations, 20 minutes each
  Cash
  Ferguson
  Hines (to be presented by Alan Duncan - secondary author)
  Jura
  11:45-1:00 Lunch
  1:00-2:20 Complete non-government presentations, 20 minutes each
  Kendrick
  Plotkin
  Stachnik
  2:20-:2:30 Break or contingency time
  2:30-4:00 Government presentations (15 minutes each)
  Batchelor (to be presented by Jan Hollis secondary author)
  Bly
  Dipirro
  Krizmanic
  Ohl
  Swanson
  4:00-4:15 Wrap up of Parallel Sessions: Open Discoussion and Q+A